

CLAIMS

What is claimed is:

- 1 1. A magnetic head having an air bearing surface (ABS), comprising:
 - 2 a writing pole, comprising:
 - 3 a pole tip for writing data to magnetic media via lines of flux emitted
 - 4 from an ABS end of the writing pole;
 - 5 a shaping layer coupled to the pole tip, the shaping layer being for
 - 6 focusing flux to the pole tip;
 - 7 a trailing shield spaced apart from the writing pole, the trailing shield causing the
 - 8 lines of flux to enter the media at an angle from a plane perpendicular to a
 - 9 surface of the media facing the writing pole; and
 - 10 a non-magnetic mask layer co-planar to the trailing shield which defines the
 - 11 height of the trailing shield.
- 1 2. A magnetic head as recited in claim 1, wherein a throat height of the trailing
- 2 shield is less than a distance from the ABS end of the writing pole to the shaping
- 3 layer.
- 1 3. A magnetic head as recited in claim 1, wherein a ratio of a distance between the
- 2 pole tip and the trailing shield, and a distance between the ABS end of the pole tip
- 3 and a writeable layer of the media, is between about 2:1 and about 1:2.

1 4. A magnetic head as recited in claim 1, wherein a distance between the pole tip
2 and the trailing shield is less than about 50 nm.

1 5. A magnetic head as recited in claim 1, wherein the trailing shield is not
2 magnetically continuous to a back gap of the magnetic head.

1 6. A magnetic head as recited in claim 1, wherein the trailing shield is magnetically
2 continuous to a back gap of the magnetic head.

1 7. A magnetic head as recited in claim 1, further comprising a return pole, the
2 trailing shield being positioned between the writing pole and the return pole.

1 8. A magnetic head as recited in claim 7, wherein the return pole is stitched to the
2 trailing shield at a position recessed from the ABS.

1 9. A magnetic head as recited in claim 1, wherein the head is a perpendicular head.

1 10. A magnetic head as recited in claim 1, wherein the trailing shield is positioned
2 adjacent a mask material, the mask material defining a throat height of the trailing
3 shield.

1 11. A magnetic head as recited in claim 10, wherein a height of the mask material is
2 greater than a distance from the trailing shield to the ABS.

- 1 12. A magnetic head structure for perpendicular recording and reading, the magnetic
- 2 head structure having an air bearing surface (ABS), comprising:
- 3 a write head portion for writing data to magnetic media, the write head portion
- 4 including:
 - 5 a first pole piece, the first pole piece having a first pole tip;
 - 6 a probe pole piece, the probe pole piece having a probe pole tip for
 - 7 emitting magnetic flux from an ABS end thereof;
 - 8 an insulation stack positioned between the pole pieces;
 - 9 at least one write coil embedded in the insulation stack;
 - 10 a shaping layer positioned between the probe pole piece and the
 - 11 insulation stack, the shaping layer being for focusing flux
 - 12 to the probe pole tip;
 - 13 a trailing shield spaced apart from the pole, the trailing shield
 - 14 causing the magnetic flux to enter the media at an angle
 - 15 from a plane perpendicular to a surface of the media facing
 - 16 the pole; and
 - 17 a return pole piece; and
 - 18 a non-magnetic mask layer which is coplanar to the trailing shield.

- 1 13. A magnetic head structure as recited in claim 12, wherein a throat height of the
- 2 trailing shield is less than a distance from the ABS end of the probe pole tip to the
- 3 shaping layer.

1 14. A magnetic head structure as recited in claim 12, wherein a ratio of a distance
2 between the probe pole tip and the trailing shield, and a distance between the ABS
3 end of the probe pole tip and a writeable layer of the media, is between about 2:1
4 and about 1:2.

1 15. A magnetic head structure as recited in claim 12, wherein a distance between the
2 probe pole tip and the trailing shield is less than about 50 nm.

1 16. A magnetic head structure as recited in claim 12, wherein the trailing shield is not
2 magnetically continuous to a back gap of the magnetic head.

1 17. A magnetic head structure as recited in claim 12, wherein the trailing shield is
2 magnetically continuous to a back gap of the magnetic head structure.

1 18. A magnetic head structure as recited in claim 12, wherein the return pole is
2 stitched to the trailing shield at a position recessed from the ABS.

1 19. A magnetic head structure as recited in claim 12, wherein the trailing shield is
2 positioned adjacent a mask material, the mask material defining a throat height of
3 the trailing shield.

1 20. A magnetic head structure as recited in claim 19, wherein a height of the mask
2 material is greater than a distance from the trailing shield to the ABS.

1 21. A method for forming a head having a trailing shield, comprising:
2 forming a gap layer above a pole;
3 forming a mask above the gap layer; and
4 forming a trailing shield above the gap layer and adjacent the mask, a throat
5 height of the trailing shield being defined between the mask.

1 22. A method as recited in claim 21, wherein the pole has a pole tip for writing data to
2 magnetic media via lines of flux emitted from an air bearing surface (ABS) of the
3 pole, the pole also having a shaping layer coupled to the pole tip, the shaping
4 layer being for focusing flux to the pole tip.

1 23. A method as recited in claim 21, wherein the gap layer is a nonmagnetic metal,
2 wherein the trailing shield is formed by plating.

1 24. A method as recited in claim 23, wherein the trailing shield is overplated such that
2 the trailing shield covers a portion of the mask.

1 25. A method as recited in claim 21, further comprising forming a return pole such
2 that the trailing shield is positioned between the pole and the return pole.

1 26. A method as recited in claim 25, wherein the return pole is stitched to the trailing
2 shield.

1 27. A method as recited in claim 21, wherein the mask is not removed from the head.

1 28. A method as recited in claim 21, wherein a height of the mask is greater than a
2 distance from the trailing shield to the ABS.

1 29. A method as recited in claim 21, wherein a throat height of the trailing shield less
2 than a distance from the ABS end of the pole to the shaping layer.

1 30. A method as recited in claim 21, wherein a ratio of a distance between the pole tip
2 and the trailing shield, and a distance between the ABS end of the pole tip and a
3 writeable layer of the media, is between about 2:1 and about 1:2.

1 31. A method as recited in claim 21, wherein a distance between the pole tip and the
2 trailing shield is less than about 50 nm.

1 32. A magnetic storage system, comprising:
2 magnetic media;
3 at least one head for reading from and writing to the magnetic media, each head
4 having:

5 a write head portion for writing data to the medium via lines of flux
6 oriented substantially perpendicular to a surface of the media
7 facing the write head portion, the write head portion including:
8 a pole tip for writing data to magnetic media via lines of
9 flux emitted from an ABS end of the pole;
10 a shaping layer coupled to the pole tip, the shaping layer
11 being for focusing flux to the pole tip; and
12 a trailing shield spaced apart from the pole, the trailing
13 shield causing the lines of flux to enter the media at
14 an angle from a plane perpendicular to a surface of
15 the media facing the pole;
16 a non-magnetic mask layer which is coplanar to the trailing shield;
17 a slider for supporting the head; and
18 a control unit coupled to the head for controlling operation of the head.